Captain Hills' corona spectra are excellent, showing a small radial extension of the lines. Captain Hills obtained a series of exposures for the flash at the beginning and end of totality, showing the whole spectroscopic history of the sun's limb, from the solar spectrum through the flash to the prominence.

Mr. Newall found the coronal spectrum too faint at a quarter diameter from the sun's limb for determination of the velocity in the line of sight, but caught the bright lines in the spectrum on another photograph at the end of totality. Mr. Newall observed very strong polarisation in the corona visually, and also observed the green coronal ring with the objective grating spectroscope.

JEUR.

The eclipse party from the Poona College of Science, under Prof. K. D. Naegamvala, had its camp at Jeur, and within two hundred yards of it were the Lick observers, under Prof W. W. Campbell. At Jeur were also the Japanese astronomers, under the direction of Prof. Taero, with Prof. Hiramaya and two assistants. Two miles further south was Mr. C. Burckhalter, with Major Harkness, Captain Dugon, and others. Every branch of eclipse work was represented at Jeur.

All the eclipse parties at this station may well be congratulated on the successful issue of their arduous labours and careful preparation. Thirty good photographs of spectra, fifteen of which are excellent, were secured by Prof. Naegamvala, and about the same number by Prof. Campbell. In the case of the Poona eclipse party these preparations were rendered particularly arduous by the very late arrival of some of the principal instruments sent out from England; Prof. Naegamvala's Cooke 6-inch spectroscope having only arrived on January 11. Upon this instrument two prisms of 45° were mounted, and the length of spectrum given by them was twelve inches. The "flash" spectrum was caught on three plates, and on one spectrum the length from D_3 to H is eight inches. The Maharajah of Kohlapore, who had liberally supported Prof. Naegamvala with funds for the eclipse instruments, specially deputed Prof. Apte to join the Poona party Prof. Apte secured some very interesting observations on the visibility of planets during the course of the phenomenon, and they will be of value in determining the intensity of the corona light.

In addition to the information given in the foregoing extracts, we learn that at the British Astronomical Association's camp at Talni good photographs of the corona were obtained, and Mr. Evershed succeeded in photographing the "flash" spectrum, and in carrying out the whole of his extensive spectroscopic programme. At Gogra, north of Nagpur, Dr. Copeland obtained photographs of the corona with his telescope of 40 feet focal length. Particulars of the instruments employed at the various stations have already been given in NATURE.

PITCHER-PLANTS.[1]

AMONG recent additions to the attractions of Kew Gardens is a house largely devoted to pitcher-plants; and the past year has seen several important additions to our knowledge of this very interesting class of plants.

Pitcher-plants, as enumerated by Prof. Vines, are found in ten genera, distributed through five widely separated natural orders, viz. (1) Sarraceniaceæ (*Sarracenia*, *Darlingtonia*, *Heliamphora*); (2) Nepenthaceæ (*Nepenthes*); (3) Asclepiadaceæ (*Dischidia*); (4) Saxifragaceæ (*Cephalotus*); (5) Lentibulariaceæ (*Utricularia*, *Genlisea*, *Polypompholyx*, *Biovularia*). Of these the only natives of this country are the "Bladder-worts" (*Utricularia*), of which several species are not uncommon in running and standing water. But the genus with which the name is usually associated is *Nepenthes*, the only representative of the order, to which about thirty-two species are assigned by Bentham and Hooker, natives of the East Indian Archipelago, or scattered through Asia, Africa, Madagascar, and Australia;[2] but the number of known species is now considerably larger. About forty species or hybrids are now under cultivation at Kew. Mr. H. J. Veitch—whose firm has done so much for the introduction of these plants into cultivation—in his admirable account of the genus in the *Journal* of the Royal Horticultural Society, gives twenty-four as the actual number of true species in cultivation, in addition to a large number of varieties, and primary, secondary, or tertiary hybrids.

Nepenthes is not grown for the sake of its blossom. The flowers, borne in terminal inflorescences, are small, and of simple type, the perianth consisting of four usually green segments. They are unisexual and diœcious. I find no reference to any insect-visitors to the flowers; and they are probably anemophilous. The interest of these plants centres in the remarkable terminal appendages to the leaves in all the known species, the ascidia or pitchers, which are constructed on a uniform general type, though varying greatly in size, form, and colour. To promote the formation of these pitchers, cultivators usually "stop" the blossoming, so that special cultivation is needed for the production of hybrids. The pitcher itself is generally regarded as an expansion of the petiole or leaf-stalk; Sir Joseph Hooker describes it as a

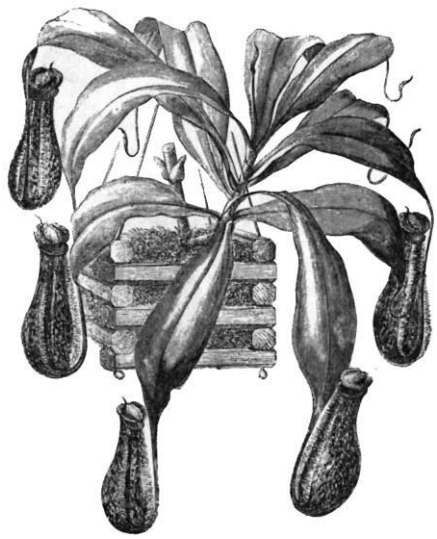

FIG. 1.—*Nepenthes Sedenii*, one-sixth natural size.

"modification of a gland situated at the apex of the midrib of the leaf." The lid is always completely closed until maturity, and the fluid is excreted within the enclosed chamber.

The composition and properties of this fluid have been the subject of many investigations. Notwithstanding that one or two recent inquirers have come to a contrary conclusion, the observations and experiments of Prof. Vines may be said to have finally settled the point that it contains a true digestive principle. The teleological bias of the eighteenth century connected these pitchers of water with the needs of thirsty travellers or of birds. Linnæus describes the pitchers as "aquam dulcem limpidam, amabilem, confortantem, frigidam suppeditantia, ad necessarium hominis usum," and goes into raptures when adopting the name *Nepenthes* proposed by Breyne:—"Cum enim et haec non Helenæ Nepenthes, certe Botanicis omnibus erit. Quis Botanicorum longissimo itinere profectus, si mirabilem hanc plantam reperiret, non admiratione raperetur, totus attonitus, praeteritorum malorum oblitus, mirificam Creatoris manum dum obstupescens adspiciret?" There are unfortunately two valid arguments against Linnæus's theory:—In the

[1] S. H. Vines, "The Physiology of Pitcher-Plants." (Reprint from *Journ. Roy. Hort. Soc.* vol. xxi., 22 pp.)
S. H. Vines, "The Proteolytic Enzyme of Nepenthes." (*Annals of Botany*, December 1897, pp. 563-584.)
H. J. Veitch, "Nepenthes." (*Journ. Roy. Hort. Soc.* 1897, pp. 226-255.)
F. W. Burbidge, Remarks on the above. (*Tom. cit.* pp. 256-262.)
F. M. Bailey, "Contributions to the Flora of Queensland," vol. i. part 1, July 1897.

[2] Mr. Bailey describes and figures two new species from Queensland.

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first place the fluid is absolutely unpotable; and secondly, nearly all the known species of *Nepenthes* grow in climates where the traveller need never be thirsty. Mr. Burbidge states that on the great mountain range of Kina Balou, in North-west Borneo, the "paradise of pitcher-plants," there is a deluge of rain every night in the year, while in the day-time the air is in a constant state of "Scotch mist." The internal surface of the pitcher is provided with a large number of specialised glands, from which the secretion is poured out into the pitcher. The fluid has a slightly acid reaction, and yields a large quantity of solid matter on evaporation; and the most trustworthy analyses that have been made show that the preponderating unorganised constituents are potassium chloride and malic and citric acids, with smaller quantities of soda, lime, and magnesia. The researches of Vines have convinced him that the pitcher secretes an enzyme which has the property of digesting organic substances in the presence of an acid which is always found in the fluid; and that this digestion is not due to the putrefactive bacteria which are always present in the liquid. All the species of *Nepenthes* are either

FIG. 2.—Pitcher of *Nepenthes Dicksoniana*, one-fourth natural size.

epiphytic or grow in wet soil, and agree with other carnivorous plants, such as *Drosera* and *Dionœa*, in having a very reduced root-system; the food-substances obtained through the pitchers thus supplying the lack of nutriment from the soil.

None of the other pitcher-plants, with the possible exception of *Cephalotus*, are, according to Vines, truly carnivorous. In most cases they are insect-traps, but they produce no digestive enzyme; the captured insects are decomposed by the microbes which abound in the fluid, and the products of decomposition absorbed by the plant. In *Darlingtonia*, and in *Sarracenia*, one species of which, the "Side-saddle-plant," is abundant in bogs in the Northern United States and in Canada, the lid is replaced by a hood, and insects are attracted by honey-glands placed near the mouth of the pitcher. In *Dischidia* the pitcher, which has no lid, is not nutritive; its main use appears to be to husband the water required by the plant. The pitchers of *Cephalotus* closely resemble in appearance those of *Nepenthes*. Several species of *Utricularia*, or Bladder-wort, are among the prettiest of our water-plants, with their pale yellow flowers and much-divided leaves, ornamented with the minute bladders, which are closed by a valve opening inwards, thus preventing the escape of innumerable aquatic animals which creep into them. It may be added in conclusion that one of our few native non-chlorophyllous root-parasites, the Tooth-wort (*Lathræa squamaria*), belonging to the Scrophulariaceæ, has singular hollow underground scale-leaves, which may be regarded as rudimentary pitchers, and resemble those on the exotic terrestrial species of *Utricularia*. Their purpose appears to be the reverse one to that of the pitchers of *Dischidia*, viz. to serve as organs for the excretion of superfluous moisture.

Our illustrations are taken from Mr. Veitch's paper on *Nepenthes* in the *Journal* of the Royal Horticultural Society. Fig. 1, a hybrid known as *N. Sedenii*, a cross

FIG. 3.—*Nepenthes Edwardsiana.*

between *N. Khasiana* and an unknown species, shows the general habit of the genus. Fig. 2 represents the magnificent pitcher of *N. Dicksoniana*, a cross between *N. Rafflesiana* and *N. Veitchii*. In Fig. 3, *N. Edwardsiana*, Hook. f., a spike of male flowers is shown; also a magnified portion of the glanduliferous surface of the pitcher. A. W. B.

A NEW ARTILLERY CHRONOGRAPH.[1]

THE ordinary chronograph used in artillery experiments consists of a falling shutter held suspended by an electromagnet whose circuit is broken by the projectile, which cuts a wire in its passage. Other wires are

[1] Based upon an article in *La Nature*, pp. 97 and 122, 1898.

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